DR. HERBERT M. KULMAN

MICHIGAN

FOREST PEST DETECTION PROGRAM

REPORT FOR 1963

COMPILED BY:

FORESTRY SECTION, MICHIGAN DEPARTMENT OF CONSERVATION

COOPERATORS:

STATE DEPARTMENT OF AGRICULTURE, U. S. FOREST SERVICE, MICHIGAN STATE UNIVERSITY, UNIVERSITY OF MICHIGAN, PRIVATE FOREST INDUSTRY

TABLE OF CONTENTS

	Page
Introduction	ii
Organization of Program	1
Program Activities	2
Cooperators' reports	3
Observation Reports	3
Critical Insects	4
Other Important Insects	17
Diseases	21
Other Conditions	23
Summary	25

Cover: Jack pine in Crawford County defoliated by the jack pine budworm.

INTRODUCTION

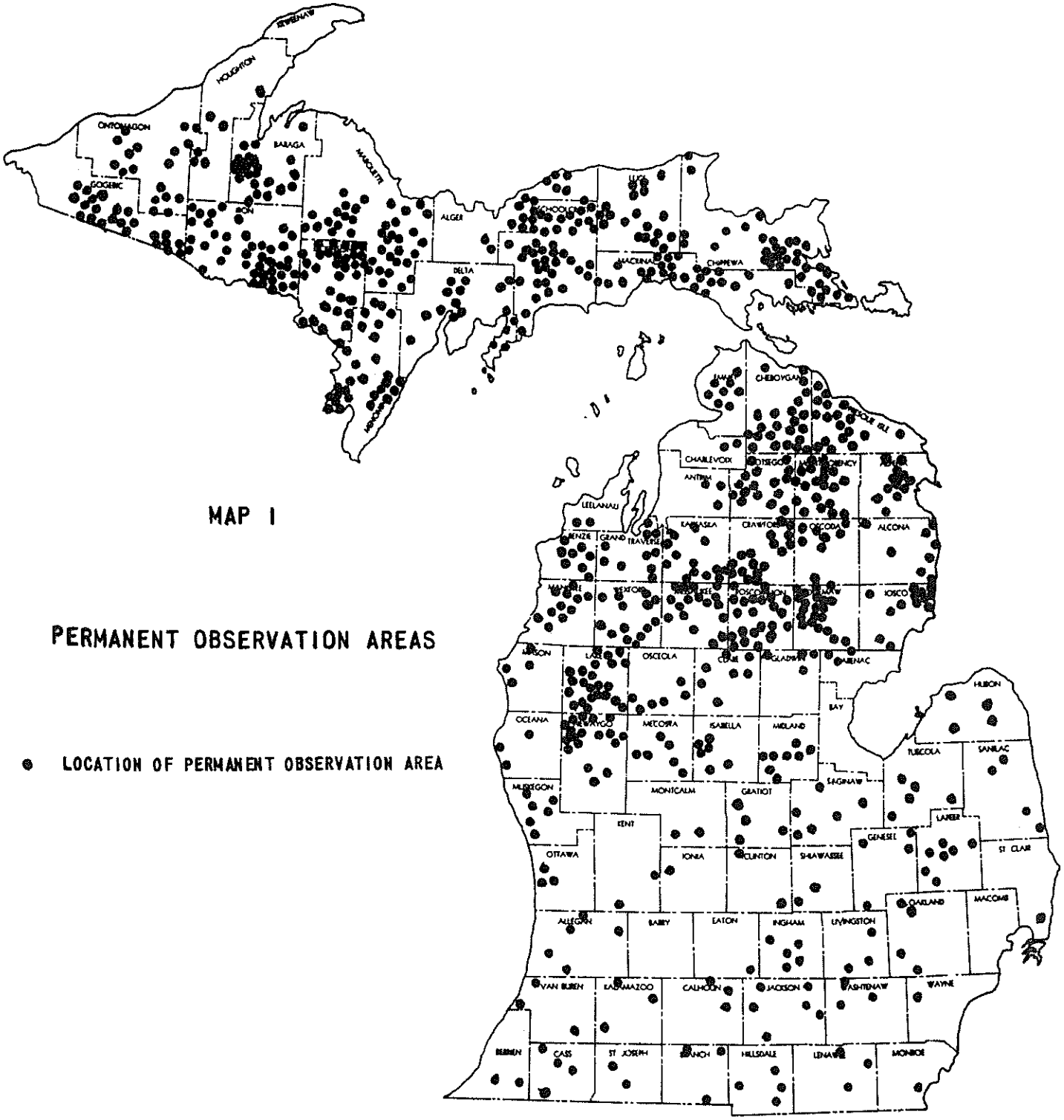
A coordinated approach to the forest insect and disease problems in Michigan is possible on a statewide basis through the Michigan Forest Pest Detection Program. Cooperators in this program are: Forestry Section, Michigan Department of Conservation; Plant Industry Division, Michigan Department of Agriculture; U.S. Forest Service; Departments of Forestry, Entomology, and Botany and Plant Pathology, Michigan State University; School of Natural Resources, University of Michigan; and private industry. The facilities of the various cooperating agencies are employed with each agency contributing in its respective field.

Cooperation with neighboring states in regional activities is an important part of the program. This was done on an informal basis through correspondence and reports during 1963, as the annual Lake States Forest Insect Work Conference was postponed until 1964.

On January 7, 1964, the annual meeting of the Michigan Forest Pest Detection Program Committee was held in Lansing to review the work carried on during 1963 by the various agencies concerned with surveys, control, and research, to discuss the annual report, and to make plans for 1964. Those in attendance were:

J. W. Butcher, Department of Entomology, M.S.U.
R. W. Blair, Packaging Corporation of America
W. S. Cath, Michigan Department of Agriculture
J. B. Cody, Kimberly-Clark Corporation
R. C. Crowther, Forestry Department, M.T.U.
T. E. Daw, Michigan Department of Conservation
A. C. Dowdy, Department of Entomology, M.S.U.
P. R. Flink, Michigan Department of Conservation
G. E. Guyer, Department of Entomology, M.S.U.
M. K. Hannah, Michigan Department of Agriculture
V. W. Johnson, Department of Forestry, M.T.U.
F. B. Knight, School of Natural Resources, U. of M.
J. W. Leonard, Michigan Department of Conservation
U. N. Martilla, U.S.F.S., National Forests
W. E. Miller, U.S.F.S., Lower Peninsula Research Center
A. F. Monroe, Soil Conservation Service
L. H. Moore, U.S.F.S., Regional Office
W. R. Ringe, U.S.D.A., Plant Pest Control Division
L. A. Ryel, Michigan Department of Conservation
F. C. Strong, Botany and Plant Pathology Dept., M.S.U.
J. E. Terrill, Michigan Department of Agriculture
M. E. Turner, U.S.D.A., Plant Pest Control Division
L. W. Wilson, U.S.F.S., Lower Peninsula Research Center
W. J. Young, Michigan Department of Agriculture

The following report of activities of the Michigan Forest Pest Detection Program for 1963 was compiled by the Forestry Section of the Michigan Department of Conservation. Pest information for federal lands was obtained in part from the Lake States Forest Experiment Station and the U.S. Forest Service Report, "Annual Regional Report on Forest Insects and Disease Condition - Region 9" for 1963.



MAP I

PERMANENT OBSERVATION AREAS

● LOCATION OF PERMANENT OBSERVATION AREA

ORGANIZATION OF PROGRAM

The successful reduction in wood losses caused by forest fires by the use of organized detection and suppression methods, focused attention on other causes of wood losses and means of reducing them. Fire, the once great destroyer of forests, has been reduced to a subordinate position behind diseases and insects. However, it must be remembered that the great potential for destruction is still present and only through continued efforts can fire losses be kept at a minimum.

Disease and insects, although not as spectacular as fire, and needing different methods for detection and suppression, nevertheless destroy tremendous numbers of trees and forest products. With this thought in mind, a forest pest detection program was outlined and organized in 1950 by the Conservation Department, with the cooperation of the U.S. Bureau of Entomology and Plant Quarantine (now the Division of Forest Insect Research, U.S. Forest Service); the U.S. Forest Service; the School of Natural Resources, University of Michigan; the Departments of Entomology, and Botany and Plant Pathology, and Forestry Extension Service, Michigan State University; and the Division of Plant Industry, State Department of Agriculture.

The objectives of the program are: (1) to detect the presence of forest insects and diseases, and to apprehend outbreaks by systematically and annually collecting records of occurrence and damage; (2) to facilitate and organize direct control in case of emergency; (3) to provide a basis for protective measures by indirect means; and (4) to provide forest land owners and managers, through the use of newspapers, reports and memoranda, up-to-date information on the status of the important forest pests.

The detection framework is built principally around the field organization of the Forestry Section of the Conservation Department, which handles state and private lands, and the U.S. Forest Service which handles federal lands. The general field plans for insects, insofar as the State Forest Division districts are concerned, calls for the establishment of permanent observation areas scattered throughout each forest district on both state and private lands in timber stands where critical insects exist or are likely to exist. (See Map I). The observation areas are permanent to the extent that the trees remain susceptible to the critical insects. After the trees on an area reach a size no longer seriously affected by certain critical insects, the observation area may be replaced by one with a younger, more susceptible forest stand. The observation area usually consists of all of the susceptible forest type on a 40 acre description and therefore may vary in size from a few acres to forty acres.

Observations are submitted on report forms annually to the Lansing Office of the Forestry Section, indicating the degree of infestation, or the absence, of each of the critical insects on the designated observation areas. Those critical insects found only in the southern part of the state are not reported on in the northern regions, and vice versa. Thus, each district forester has only six or eight critical insects to observe.

However, foresters are requested to report the presence of any insect observed on the areas that might become important or that has not previously been found in their area.

The two educational institutions participate in training programs and act in an advisory capacity on insect and disease identification and control measures, as does also the Division of Forest Insect Research of the U.S. Forest Service.

The State Department of Agriculture, through its Division of Plant Industry, is directly concerned in the program by virtue of its statutory authority to establish quarantines, to enter on private lands for purposes of inspection and, where necessary, to compel or provide for the control of serious insect pests and contagious plant diseases.

The disease phase of the program does not follow the same routine as applied to insects, since there are relatively few "critical" forest diseases requiring constant surveillance. Individual programs have been developed for the most important diseases with various state and federal agencies cooperating in survey and control work.

* * *

PROGRAM ACTIVITIES

INFORMATION RELEASES

Informational releases, in the form of general memoranda, were issued periodically to all cooperators to keep them up-to-date on the current forest pest situation, unusual conditions in their areas, new pests, time for control applications or other important information.

COOPERATIVE REPORTS

The Michigan Forest Pest Detection Program helps to provide information for other cooperative reports as follows:

Weekly Insect Report - Michigan State University - A weekly report of the current insect situation was initiated by the Department of Entomology, Michigan State University, in 1963, including all types of important insect pests, in addition to forest insects. Other features of the report are the maps of the previous week's temperatures, precipitation and other weather data and how it relates to insects. Information on insect conditions gained through the Michigan Forest Pest Detection Program is forwarded to Michigan State University for inclusion in these weekly reports.

Cooperative Economic Insect Report - Information for the above report is forwarded by Michigan State University to the Plant Pest Control Division, Agricultural Service, U.S. Department of Agriculture, for inclusion in the Cooperative Economic Insect Report. This report is a weekly resumé of important insects in the United States and includes a section on forest insects.

Annual Regional Report on Forest Insect and Disease Conditions - Region 9, U.S.F.S. - Annually the forest pest situation in the Lake States is summarized by the U.S. Forest Service Regional Office in Milwaukee, Wisconsin, from information submitted by the states and also collected by the Forest Service. Periodically

during the summer, summaries of the forest pest situation in Michigan are forwarded to the U.S. Forest Service Regional Office for inclusion in their reports.

Status Report on Forest Insect Conditions - The information compiled in the previously mentioned report by the U.S. Forest Service in Region 9 is included in the "Status Report of the Forest Insect Conditions" covering the United States and published annually by the Division of Forest Insect Research, Forest Service, U.S. Department of Agriculture in Washington, D.C.

* * *

COOPERATORS' REPORTS

Cooperators aid in the detection program by reporting on insect conditions in areas not covered by state foresters, thus helping to present a better overall picture of the forest insect situation in the state. This cooperation takes the form of reporting on permanent observation areas, helping with special surveys, and/or reporting by letter, insect conditions that come to their attention.

Many companies and agencies have contributed to the detection program at various times in the past and are expected to in the future when important pests threaten the forests under their jurisdiction. The following cooperators submitted reports or observations during 1963:

Abitibi Corporation
Consumers Power Company
Kimberly-Clark Corporation
Michigan State University
North American Timber Co., Packaging Corporation of America
Oliver Iron Mining Division, U.S. Steel Corporation
Plant Industry Division, Michigan Department of Agriculture
U. S. Forest Service
The University of Michigan

* * *

OBSERVATION REPORTS

A total of 1,830 observation reports was received and analyzed by the Lansing office of the Forestry Section. Of this total, 1793 were on the critical insects, representing a decrease of 57 critical insect reports from those received in 1962. The decrease is due to the discontinuance of reporting some insects on those areas not considered suitable. In some cases the unsuitable observation areas have not been replaced as it is expected that the major reorganization within the Conservation Department will affect many forest boundaries. When the boundaries are finalized, all observation areas will again be checked for suitability and coverage throughout the forested area and observation locations dropped or added as the necessity arises.

* * *

CRITICAL INSECTS

The list of critical forest insects in Michigan has been changed from time to time to include actively or potentially injurious insects and to remove from the list those which are no longer considered thus.

The insects on the critical list are those on which regular observation area reports are submitted. During 1963, the following insects were on the critical insect list:

Insect	Area Reporting (1 Upper Peninsula, 2 Northern Lower Michigan, 3 Southern Lower Michigan)
European pine sawfly	3
European pine shoot moth	2,3
Forest tent caterpillar	1,2
Saratoga spittlebug	1,2
Anomala beetle	2
Jack pine budworm	1,2
Spruce budworm	1
Larch sawfly	1,2
White pine weevil	1,2,3
Red-headed pine sawfly	1,2

At the December, 1962 meeting of the Michigan Forest Pest Detection Program Committee, it was recommended that some observation areas be established in hardwood stands to determine the insects present. These areas were not established in 1963, due to the pending reorganization of the Conservation Department forest districts. It is not expected that such observation areas will be established in 1964 but will be delayed until reorganization plans are definite and put into effect.

Following are reports of critical insects for 1963:

JACK PINE BUDWORM - *Choristoneura pinus* Free.

In Lower Michigan, budworm populations built up in 1962 and 1963 and very heavy defoliation occurred in sections of the following counties: Montmorency, Otsego, Alcona, Oscoda, Crawford, Kalkaska, Grand Traverse, and Ogemaw. The amount of jack pine acreage or the value involved in the outbreaks is not known at present but will be determined from surveys during the spring of 1964. The necessity of control action will be determined at that time.

Previous outbreaks in Michigan have usually disappeared without causing much tree mortality of merchantable timber. The present infestation, however, could have more serious effects because of the drought conditions existing in most jack pine stands.

Reports from observation areas did not indicate the above outbreaks, as unfortunately few of the observations areas were located in the outbreak. However, communications from foresters disclosed the general outbreak areas. No reports of heavily defoliated observations areas were received. Observation areas with moderate defoliation were in Montmorency, Otsego, Grand Traverse, Crawford, Oscoda, Mason, Lake and Newaygo counties. (See Map II)

Some tree mortality has been reported after the heavy defoliation in 1963. Unless the drought conditions are alleviated, another year of heavy defoliation will probably result in considerable tree mortality, either directly due to the jack pine budworm or to secondary fungi and bark beetles.

The amount of needles and the number of caterpillars were apparently well balanced in the outbreak areas in 1963, as the younger understory trees did not suffer as heavy defoliation as expected. If the population remains high another year, much heavier defoliation of the understory is expected, resulting in mortality of the small trees. (See Figure 1.)

Summary of Reports

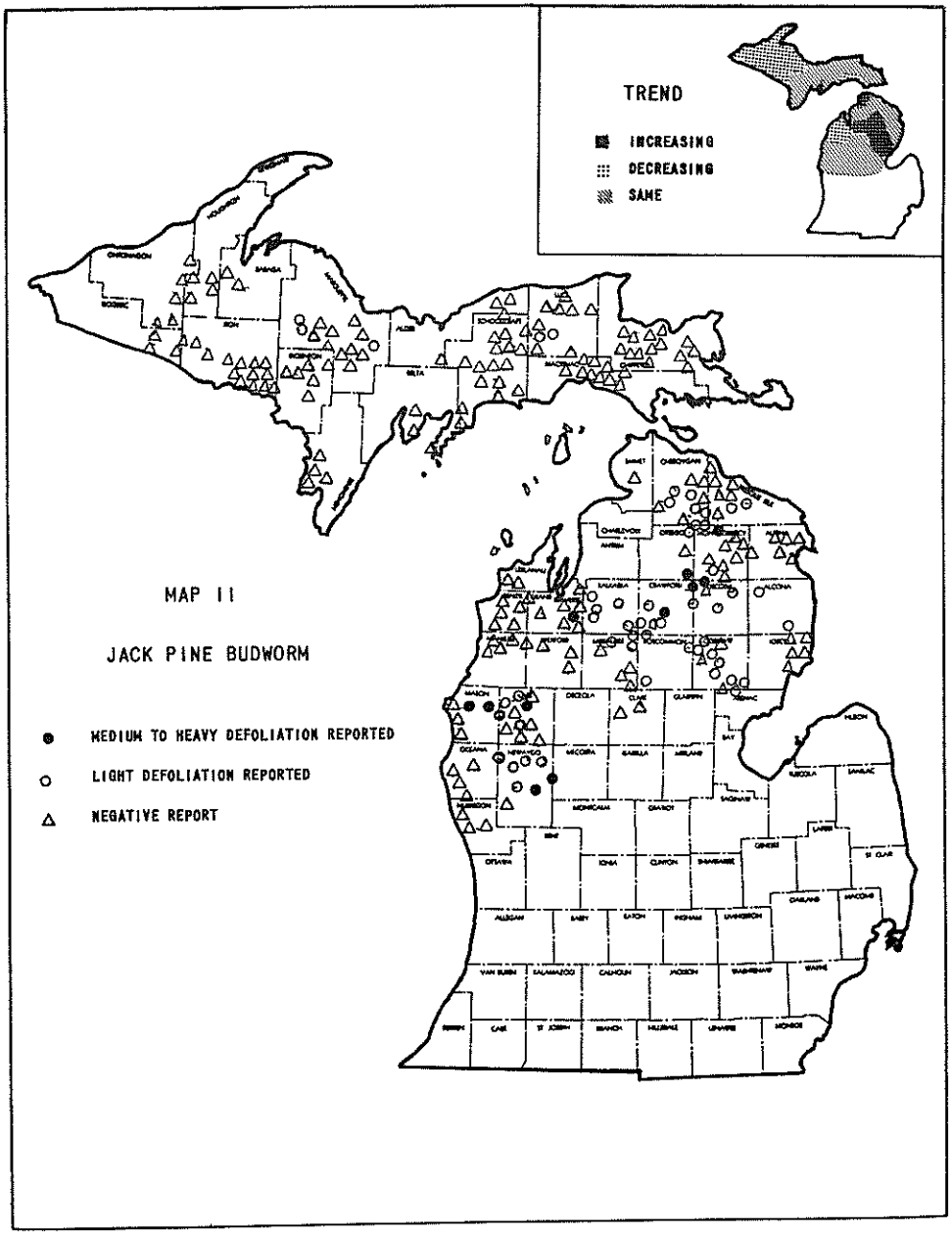
	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	135	185	232	280	291	276	267	269	246	244	301	247	243
% Positive....	38	40	32	20	20	29	22	19	14	11	28	28	18

Breakdown of 1963 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....10.....(22%)
Light defoliation (1-20%).....35.....(78%)

Figure 1.

Jack pine budworm defoliation seriously injures young jack pine.


TREND
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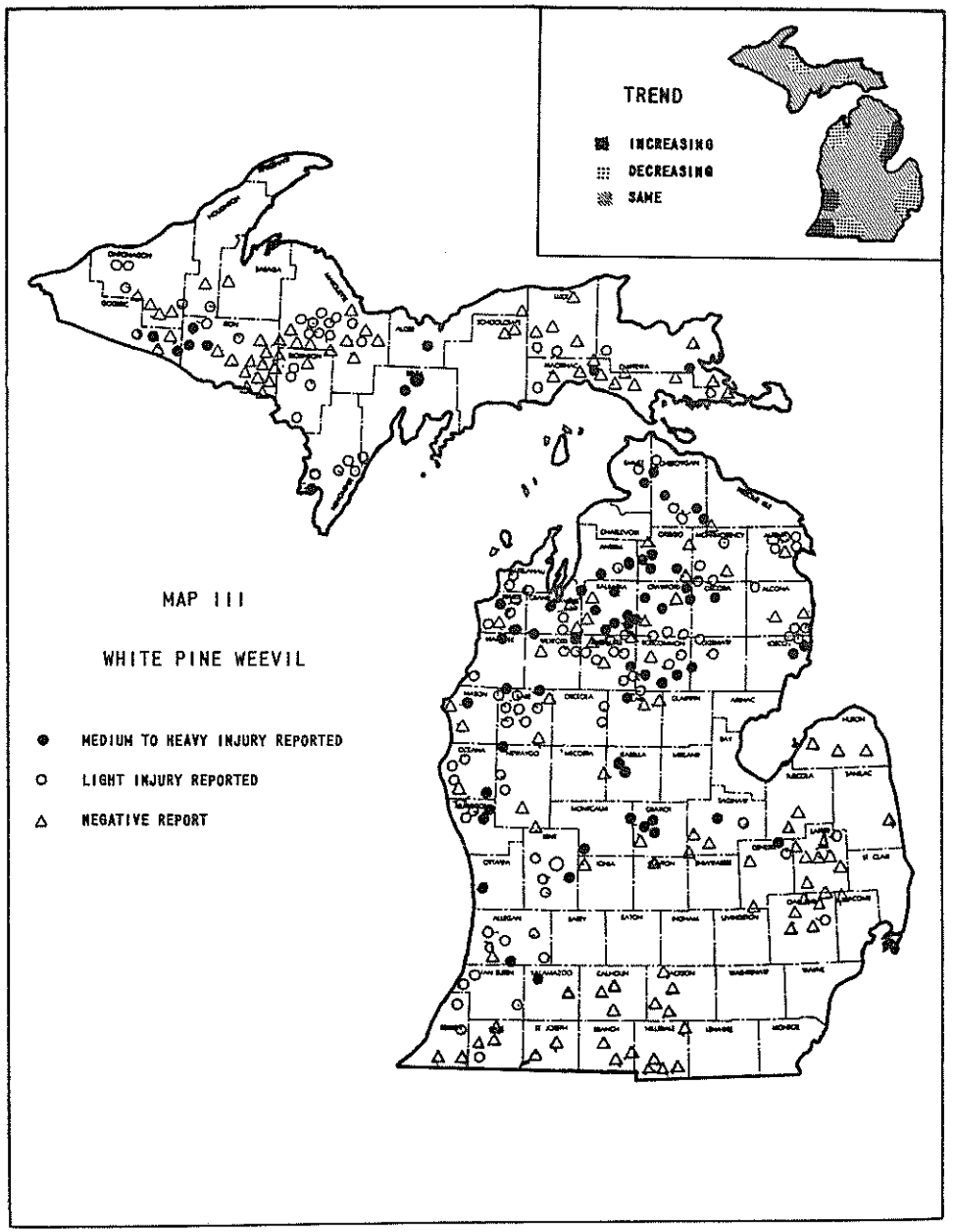
MAP II
JACK PINE BUDWORM
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT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MAP III
WHITE PINE WEEVIL
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
NEGATIVE REPORT

WHITE PINE WEEVIL - Pissodes strobi (Peck)

Weevil damage remained at about the same high level in 1963. It is found throughout the state wherever white, Scotch or jack pine grows, except for the extreme southeastern section of the state. The weevil continues to be a serious problem in plantations of these species and is becoming of increasing importance in red pine plantations.

The heaviest concentrations of weevil damage are in the northern part of Lower Michigan. This is also the area of heaviest concentration of pine plantations.

Weevil injury to over 40 percent of the trees was reported on observation areas in Gogebic, Delta and Alger counties in the Upper Peninsula, and Emmet, Isabella, Gratiot, Saginaw, Tuscola and Allegan counties in Lower Michigan. (See Map III.)

It is expected that the weevil populations will continue at a high level in 1964.

The U.S. Forest Service reported that on the White Cloud Ranger District, the weevil has caused severe damage to underplanted white pine, despite a heavy oak overstory. In most areas, hardwood overstories greatly reduce the incidence of damage.

Control

Jack pine on 95 acres in Grand Traverse County, 25 acres in Benzie County, and 18 acres in Wexford County on the Fife Lake State Forest, and 136 acres in Otsego County on the Pigeon River State Forest, was sprayed in April, 1963 to prevent weevil attack.

Jack pine sprayed was generally about three to five feet in height and had about 15 percent of the trees in the plantation weeviled the previous year. To spray the jack pine terminals on 274 acres, 465 man-hours of inmate labor, and 1,451 gallons of DDT solution were used.

Surveys made in treated plantations indicated control was good and that infestations were low, varying from 0% to less than 1%.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	39	33	231	278	319	306	317	335	333	306	385	339	329
% Positive....	82	64	65	59	60	53	56	62	58	62	59	56	61

Breakdown of 1963 Reports

Heavy injury (41-100% of leaders killed).....13.....(6%)
Medium injury (11-40% of leaders killed).....54.....(27%)
Light injury (1-10% of leaders killed).....133.....(67%)

EUROPEAN PINE SHOOT MOTH - Rhyacionia buoliana (Schiff.)

European pine shoot moth populations declined in 1963, as considerably fewer reports of heavy and medium injury were received. Part of this decline, however, is probably due to the trees becoming larger and less severely damaged on the observation areas, and the replacing of observation areas with large trees by smaller, recently planted trees.

Heavy damage by the shoot moth was reported on observation areas in Huron, Lapeer, Genesee, Livingston, Lenawee, Mason and Iosco counties. An infested plantation was reported by the U.S. Forest Service in Ontonagon County. This is the first time the insect has been found in this county. Elsewhere in the Upper Peninsula, the shoot moth is known to be present in Chippewa, Luce, Mackinac, Schoolcraft, Delta, and Houghton counties. In these areas and in north central lower Michigan, the shoot moth persists, but causes little damage. (See Map IV).

Occasional cold winters reduce the shoot moth population in most areas of the state, allowing trees on the better soils to recover and grow, in spite of some shoot moth damage. On poorer soils, particularly where a considerable number of the larvae live in buds and shoots that remain beneath the snow during the winter and are thus protected from low temperatures, the trees remain in a stunted condition for a long period of time.

Control

Control operations on state land have been limited to spraying in the nurseries to prevent infestation of the stock.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	44	80	119*	203	207	258	242	229	225	238	269	249	219
% Positive....	80	40	47	39	49	42	48	51	52	44	48	52	40

*Increase due to inclusion of insect on critical list of districts in northern half of lower peninsula.

Breakdown of 1963 Reports

Heavy injury* .....8.....(9%)
Medium injury* .....3.....(3%)
Light injury* .....77.....(88%)

*Degree of injury = "I" = $\frac{\%\text{ of susceptible trees attacked} \times \%\text{ of tips infested}}{100}$

Heavy if "I" is greater than 20
Medium if "I" is between 10 and 20
Light if "I" is less than 10

RED-HEADED PINE SAWFLY - Neodiprion lecontei (Fitch)

The red-headed pine sawfly remained at a low level. Following the sudden collapse in the sawfly population in northwestern Lower Michigan in 1961, there has been few reports of sawfly defoliation. This insect has been cyclic in the past, with recent serious outbreaks occurring in the mid-1930's, mid-1940's and late 1950's.

Light injury was reported from Dickinson, Emmet and Grand Traverse counties and moderate injury from Dickinson and Missaukee counties. (See Map V.)

It is expected that the red-headed pine sawfly will remain at a low level in 1964 and no special surveys or control projects are being planned.

There was no spraying for control of the sawfly on state land in 1963.

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	133	173	231	230	260	255	239	249	233	248	284	258	226
% Positive....	18	7	8	8	5	5	16	14	18	9	7	3	2

Breakdown of 1963 Reports

Heavy defoliation (11-100% susceptible trees attacked).....0.....(0%)
Medium defoliation (2-10% susceptible trees attacked).....2.....(40%)
Light defoliation (0-1% susceptible trees attacked).....3.....(60%)

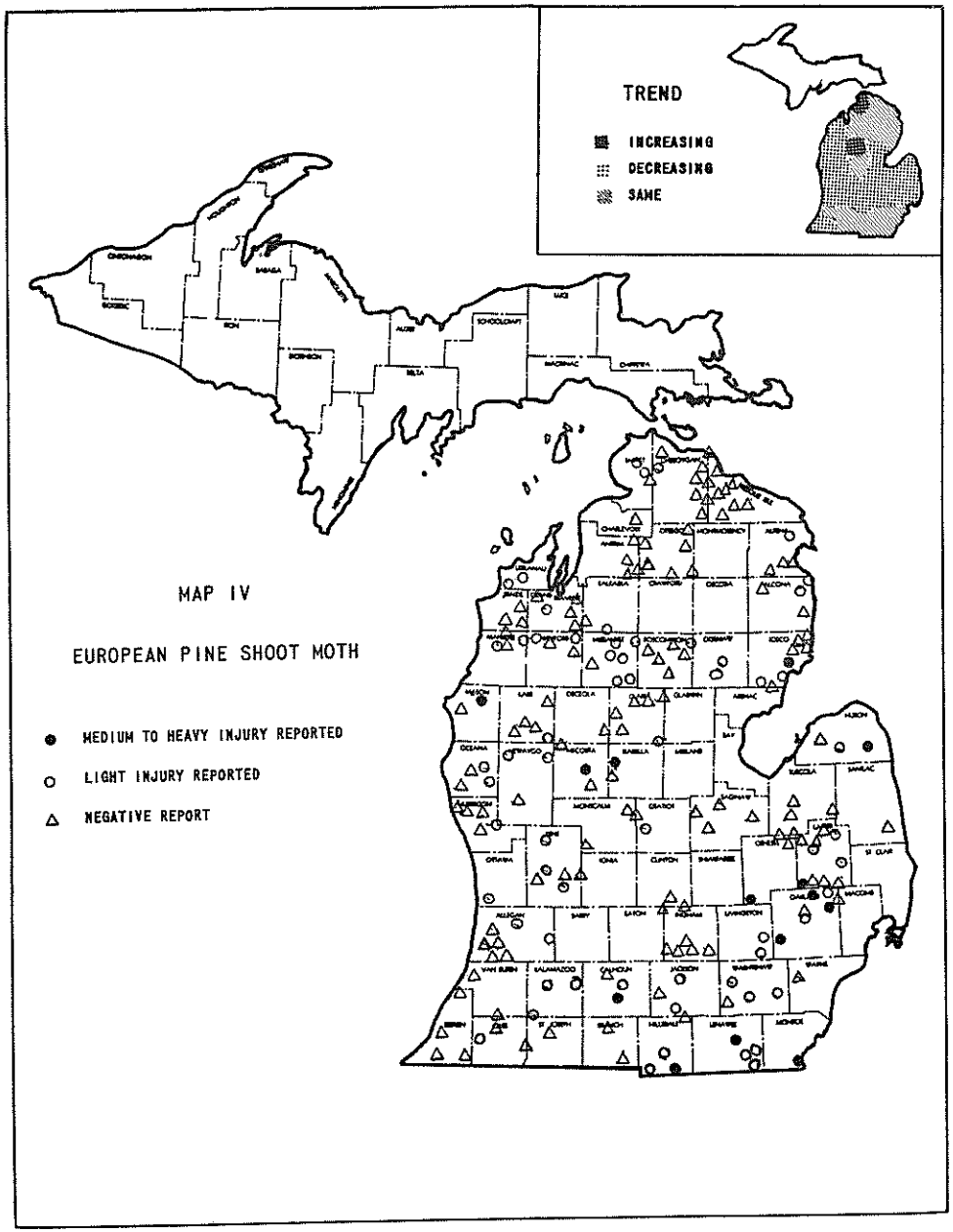
SARATOGA SPITTLEBUG - Aphrophora saratogensis (Fitch)

Saratoga spittlebug populations remained about the same in 1963 as in 1962, with generally very light infestations in plantations where sweet fern is found in abundance. In the western Upper Peninsula numbers declined somewhat, as the spittlemasses were less numerous on sweet fern than the previous year.

Moderate damage was reported on observation areas in Crawford County. Light infestations were reported in most other counties in the northern part of Lower Michigan and in the Upper Peninsula. (See Map VI.)

Surveys and Control

Surveys by the U.S. Forest Service indicated the necessity of control to prevent serious damage to 4,253 acres of red pine plantations on the Lower Michigan National Forest. DDT was aerially applied at the rate of one pound per acre and resulted in excellent control.


TREND
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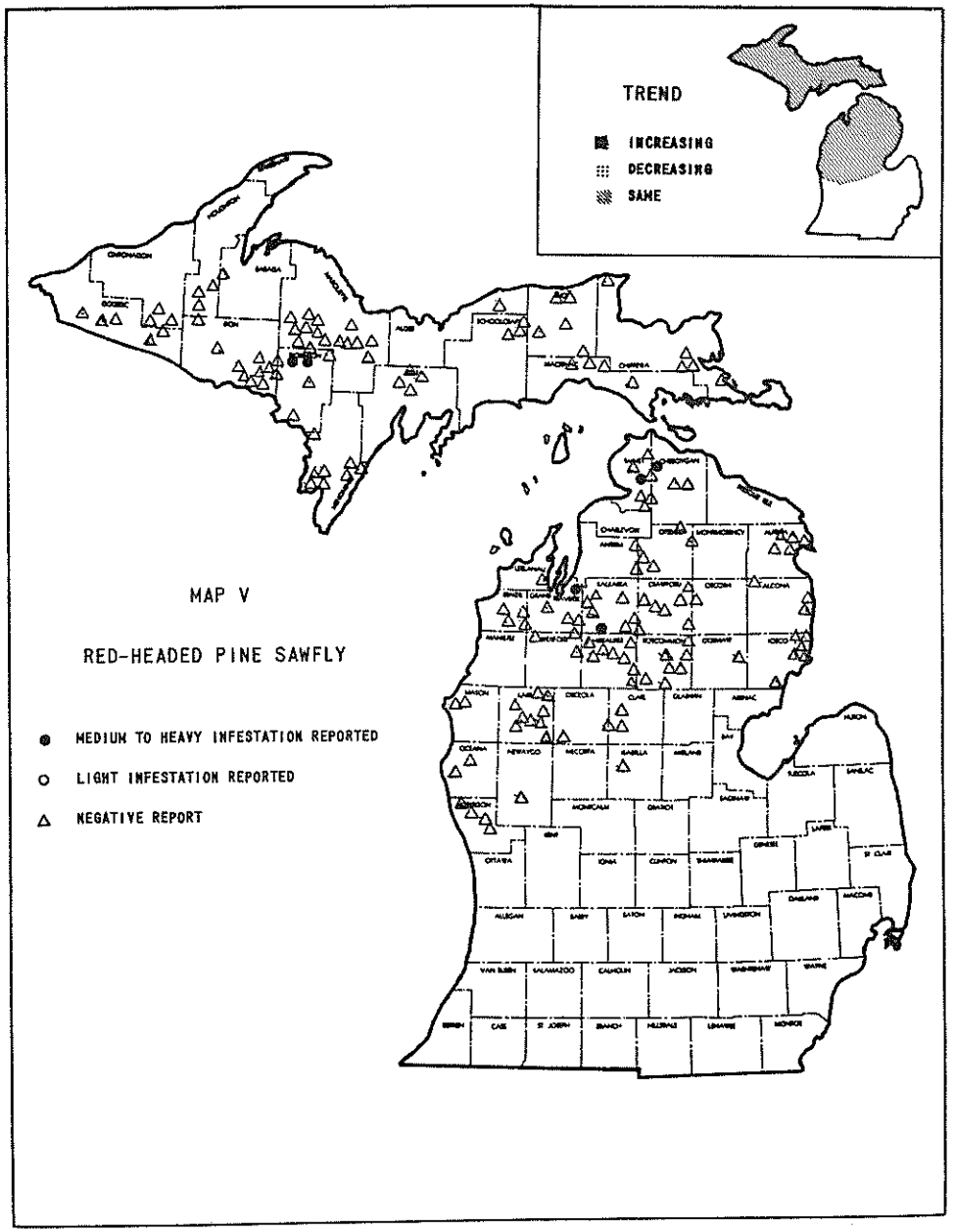
MAP IV
EUROPEAN PINE SHOOT MOTH
MEDIUM TO HEAVY INJURY REPORTED
LIGHT INJURY REPORTED
NEGATIVE REPORT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MAP V
RED-HEADED PINE SAWFLY
MEDIUM TO HEAVY INFESTATION REPORTED
LIGHT INFESTATION REPORTED
NEGATIVE REPORT

Summary of Reports - Saratoga Spittlebug

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	17	51	164	211	229	225	214	240	221	227	268	236	211
% Positive....	88	27	34	23	28	27	30	32	42	34	36	33	34

Breakdown of 1963 Reports

Heavy injury (61-100%).....0.....(0%)
Medium injury (21-60%).....1.....(1%)
Light injury (1-20%).....70.....(99%)

ANOMALA BEETLE - Anomala oblivia Horn

Anomala beetle populations caused less defoliation in northern Lower Michigan than in 1962. Considerable variation in the degree of defoliation occurred in adjacent plantations, with some plantations noticeably defoliated and others with no apparent damage.

No reports of over 20 percent defoliation were received from the observation areas. Reports of light defoliation were received from Presque Isle, Cheboygan, Montmorency, Kalkaska, Leelanau, Benzie, Grand Traverse, Manistee, Wexford, Ogemaw, Iosco, Lake, Oceana and Newaygo counties, all in Lower Michigan. The anomala beetle has not been found in the Upper Peninsula. (See Map VII.)

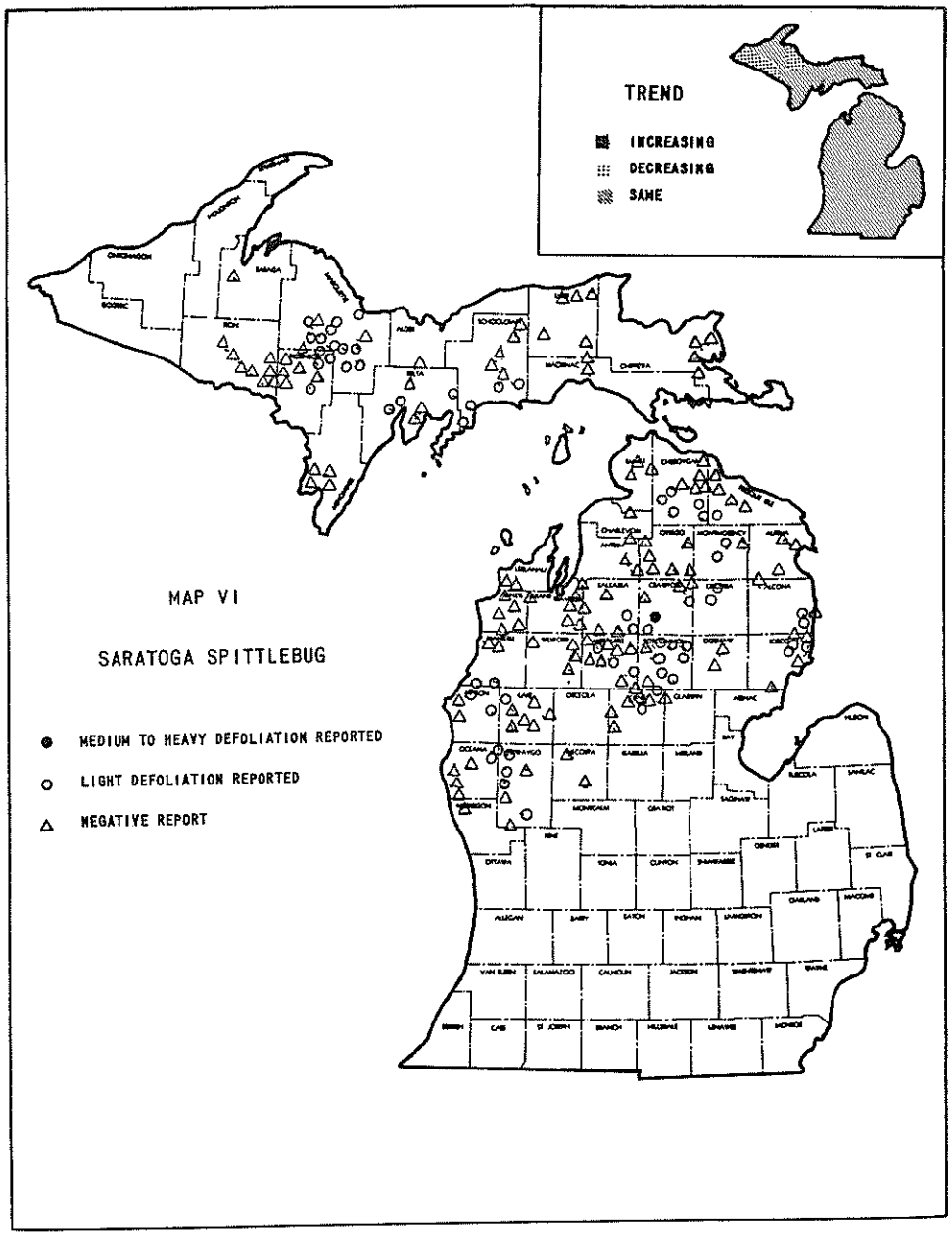
Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	119	181	236	278	275	271	269	243	239	140	203	178	144
% Positive....	35	36	32	38	38	37	22	14	14	29*	28	31	25

*The apparent increase in percent of positive reports is due to the dropping of observations for this insect in the U.P. where it has never been found.

Breakdown of 1963 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%).....36.....(100%)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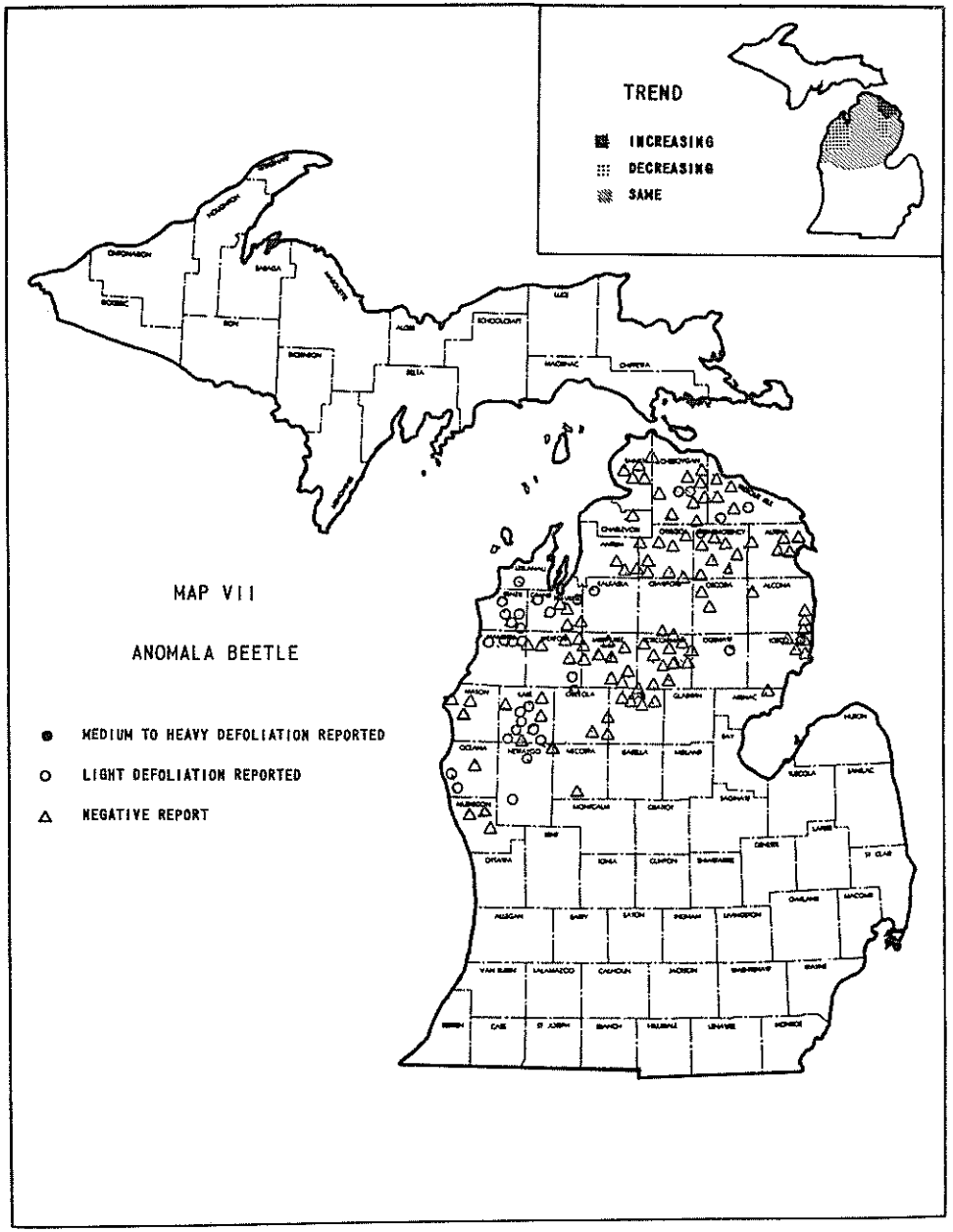
MAP VI
SARATOGA SPITTLEBUG
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT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MAP VII
ANOMALA BEETLE
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT

LARCH SAWFLY - Pristiphora erichsonii (Htg.)

The larch sawfly continued to decrease throughout most of its range, with many reports indicating the lightest defoliation in many years. The larvae could be found in all larch stands in northern Michigan, but were not numerous enough to cause the widespread heavy defoliation such as occurred during 1959 and the preceding few years. Scattered tree mortality has been observed in some stands, but is not of sufficient magnitude to cause much concern at present.

Populations of the larch sawfly, and the resulting defoliation, vary greatly from stand to stand in the same area, and from year to year.

Only two negative reports were received, one in Benzie County and the other in Manistee County, both in northwestern Lower Michigan. (See Map VIII.)

Summary of Reports

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	68	113	137	135	145	140	133	131	118	116	130	119	119
% Positive....	0	30*	42	73*	66	81	85	95	97	99	99	96	98

*The apparent increase is largely due to intensified surveys rather than build-up of insect populations.

Breakdown of 1963 Reports

Heavy defoliation (61-100%).....10.....(9%)
Medium defoliation (21-60%).....58.....(49%)
Light defoliation (1-20%).....49.....(42%)

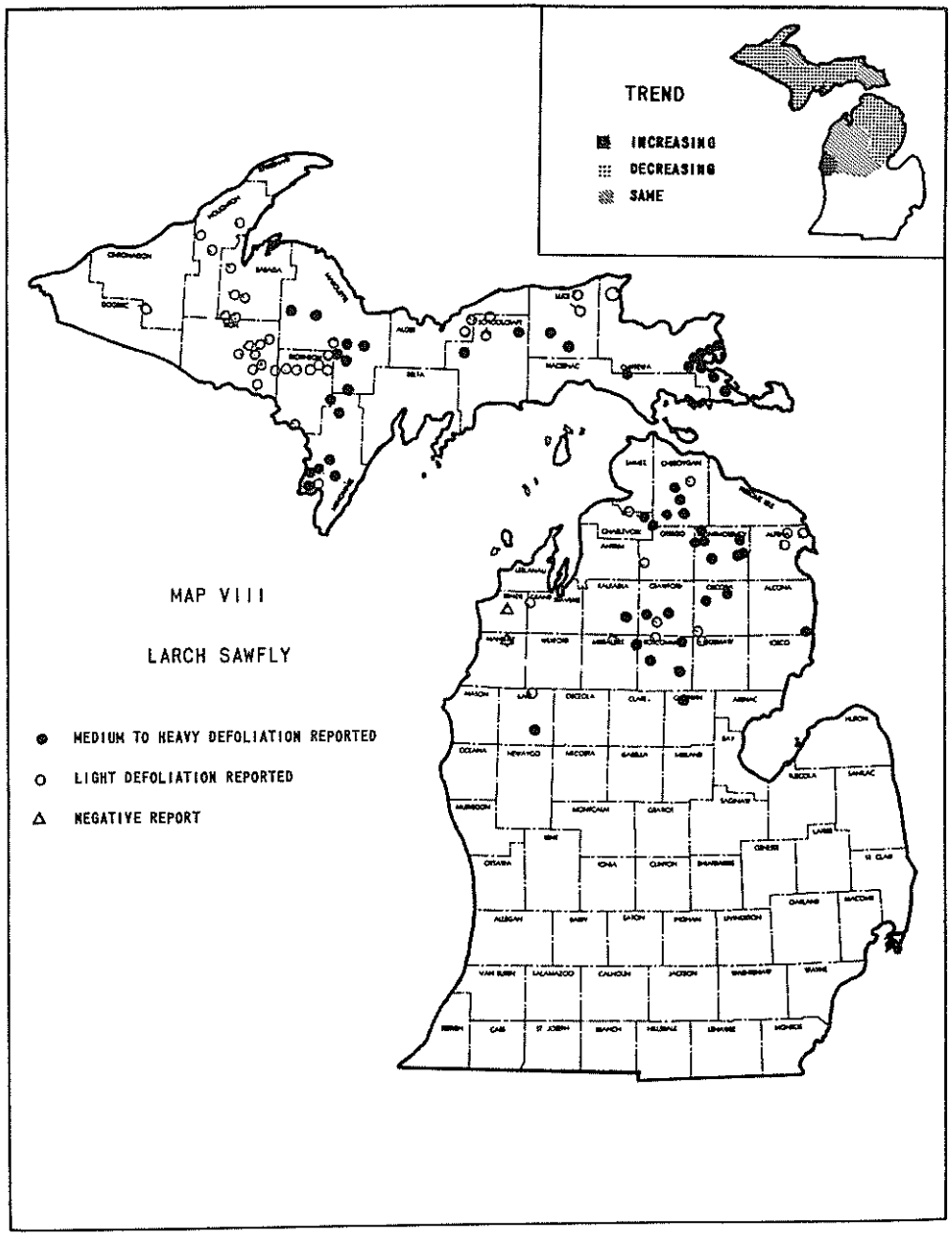
EUROPEAN PINE SAWFLY - Neodiprion sertifer (Geoff.)

Populations of the European pine sawfly were again at a high level in southern Lower Michigan, with reports of increasing populations in the Ingham-Clinton county area, as well as the southeastern counties.

Reports of medium to heavy defoliation were received from Huron, Clinton, Shiawassee, Ingham, Livingston, Calhoun, Jackson, Washtenaw, Hillsdale and Lenawee counties. (See Map IX.)

Many of the plantations in the southern portion of the state are sprayed with insecticides, thereby helping to keep this sawfly from causing more serious defoliation.

There has been very little carry-over of the virus sprayed in 1961 and 1962. In one area sprayed in 1961, the population has again built up to as high or higher than before spraying.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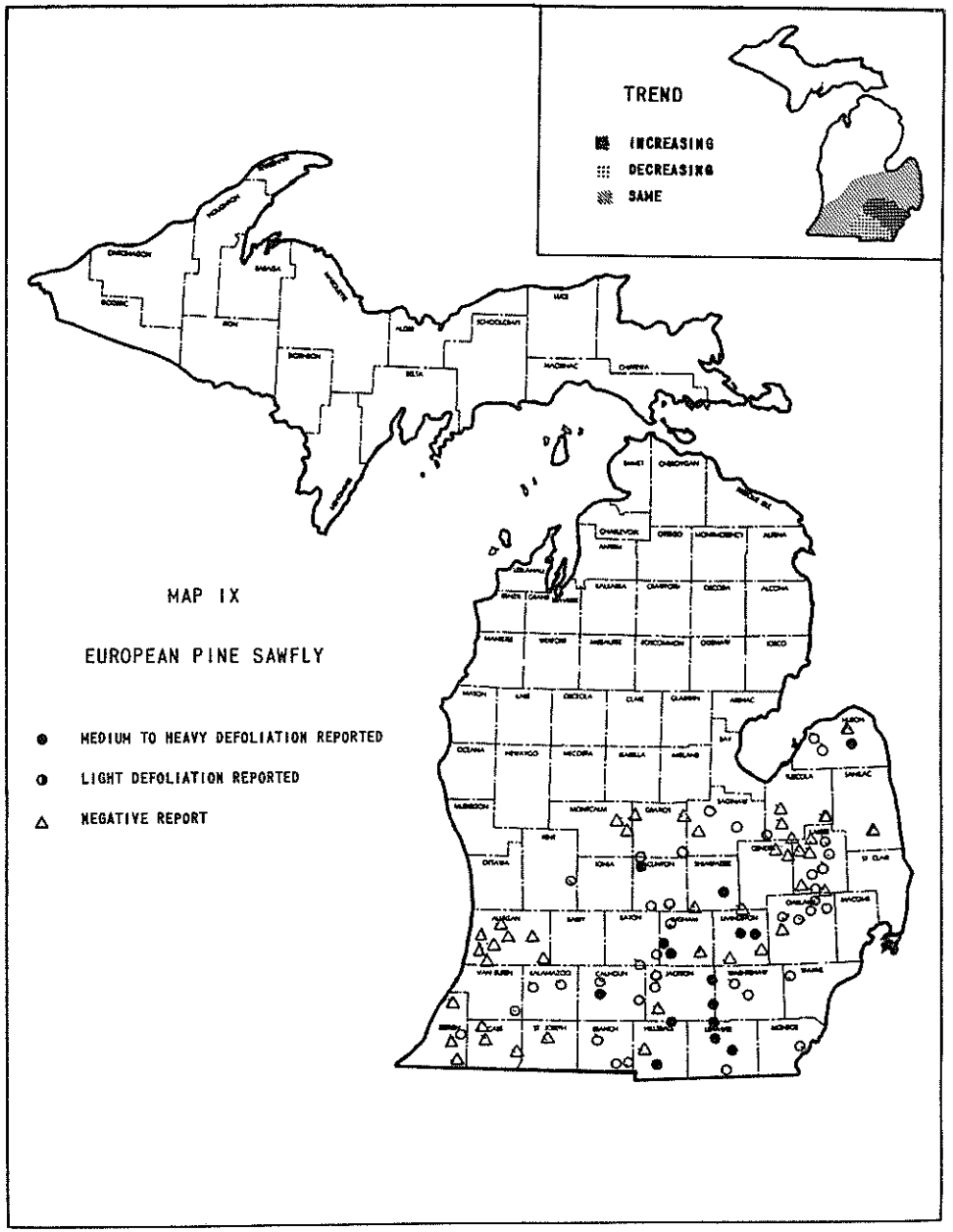
MAP VIII
LARCH SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT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MAP IX
EUROPEAN PINE SAWFLY
MEDIUM TO HEAVY DEFOLIATION REPORTED
LIGHT DEFOLIATION REPORTED
NEGATIVE REPORT

Summary of Reports - European Pine Sawfly

	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	31	64	85	82	111	100	104	91	97	89	96	87	98
% Positive....	87	69	74	75	74	62	56	59	48	57	61	67	60

Breakdown of 1963 Reports

Heavy defoliation* .....10.....(17%)
Medium defoliation* ..... 6.....(10%)
Light defoliation* .....43.....(73%)

*Degree of defoliation = "D" =

$$\frac{\text{\% of susceptible trees attacked} \times \text{\% of defoliation}}{100}$$

Heavy if "D" is greater than 24
Medium if "D" is between 9 and 24
Light if "D" is less than 9

FOREST TENT CATERPILLAR - Malacosoma disstria Hbn.

Forest tent caterpillars were found in many aspen and hard maple stands throughout northern Michigan, but due to the presence of aspen leaf rollers, linden loopers, and other insects, it was difficult to assess the amount of defoliation caused by the forest tent caterpillars. However, even where other insects were not present in large numbers and forest tent caterpillars were easily found, no noticeable defoliation was observed.

Heavy frosts in late May and June may have caused a reduction in the population, as it had been anticipated from the increase in numbers during the past few years, that heavier defoliation would occur. According to the Canadian Department of Agriculture, predicted widespread increases of the current outbreak in Canada failed to materialize in 1963. The decline was attributed to the late spring frosts.

No signs of an increase in the forest tent caterpillar populations were reported from the Upper Peninsula. In the northern Lower Peninsula, it is expected that the caterpillars will be common but should not cause widespread defoliation in 1964.

Light defoliation was reported on observation areas in Alpena, Emmet, Montmorency and Roscommon counties.

Summary of Reports - Forest Tent Caterpillar

	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963
Total.....	117	120	111	114	109	119	113	130	109	120
% Positive....	23	17	5	4	0	3	3	2	5	3

Breakdown of 1963 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%).....4.....(100%)

SPRUCE BUDWORM - Choristoneura fumiferana (Clem.)

Spruce budworm continued at the same endemic levels, with no areas of outbreaks reported in Michigan. Budworm caterpillars could be found in many spruce-fir stands, but no noticeable defoliation was reported.

Summary of Reports

	1956	1957	1958	1958	1960	1961	1962	1963
Total.....	40	29	30	25	30	24	21	31
% Positive....	2	3	3	0	0	0	0	0

Breakdown of 1963 Reports

Heavy defoliation (61-100%).....0.....(0%)
Medium defoliation (21-60%).....0.....(0%)
Light defoliation (1-20%).....0.....(0%)

* * *

PINE ROOT COLLAR WEEVIL - Hylobius radicis Buch.

Scotch, red and jack pine plantations were seriously damaged by the pine root collar weevil, particularly in western Lower Michigan. Tree mortality occurred in plantations as young as five years and as old as 30 years. Although the mortality is usually confined to plantations, natural red pine was killed in one place in Schoolcraft County in the Upper Peninsula.

Becuase of the high susceptibility of Scotch pine to the weevil, serious build-ups and the resulting mortality are going to eliminate many plantations that have grown past Christmas tree size from producing a merchantable crop.

The root collar weevil is a particularly serious problem because of the difficulty of controlling it economically by chemical means. The most heavily damaged plantations are those on light sandy soil, with poor stocking and a long root crown area due to deep planting. (See Figure 2.) Pure plantations of red pine are seldom heavily damaged.

Figure 2.

Pine root collar weevil damage to planted red pine. Knife indicates ground line.

LINDEN LOOPER - Erannis tilaria (Harr.)

Most species of hardwoods were defoliated by the linden looper in an area about 15 miles square, north of Harbor Springs in Emmet County. Although commonly found throughout Michigan, this is the only area of heavy defoliation reported in recent years. While it is not expected that the defoliation will have any serious effect on the trees, the presence of the tremendous number of caterpillars in an intensively used resort area caused much concern during 1963.

ASPEN LEAF ROLLERS

Widespread defoliation of trembling aspen by aspen leaf rollers occurred during May in north central and northeastern Lower Michigan, from Ogemaw County northward. Several species were involved, with one of the primary species being Epinotia nissella creddleana. Some areas were less heavily defoliated than in 1962, while others were more completely stripped. In the heavily defoliated areas, the trees remained with thin crowns throughout the summer.

In addition to Lower Michigan, several areas of aspen in the eastern end of the Upper Peninsula were attacked.

EASTERN TENT CATERPILLAR - Malacosoma americana (F.)

Eastern tent caterpillar webs and caterpillars were very noticeable throughout much of Lower Michigan for the third year. Many large cherry trees were completely stripped and had over 15 webs. In northern Lower Michigan, the number of caterpillars were greatly reduced during early summer, possibly by frost in late May and June, and cocoons and moths were fewer than expected.

GYPSY MOTH

The following information on the gypsy moth was received from the Division of Plant Industry, Michigan Department of Agriculture, and is a summary of their work on the gypsy moth during 1960:

The 1963 summer trapping program is the fourth since 1954 in which no male moth recoveries were made. Previous negative years were 1957, 1960 and 1962.

With the use of a new synthetic sex attractant and improved trap, the survey data are considered to be highly significant of actual conditions. Ten seasonal trap tenders placed 3,056 traps in five central Michigan counties as follows:

	No. of Traps Set	Acreage Involved
Clinton	540	43,840
Eaton	1,498	155,520
Ingham	878	141,440
Ionia	99	11,520
Shiawassee	41	6,400
Totals	3,056	358,720

WHITE GRUBS - Phyllophaga spp.

The largest control project on state land in 1963 was directed towards the prevention of damage by white grubs to newly planted seedlings. This was accomplished by spraying the roots and soil immediately surrounding the roots with a 1/2 percent aldrin solution from a sprayer attached to the planting machine, or by dipping the roots in an aldrin solution prior to hand planting.

During 1963, 4,548,969 trees planted on 6,047 acres of state land were treated to prevent grub damage. The following acreages were treated:

Planting, using machine mounted sprayer

Grand Sable State Forest	1,634 acres
Lake Superior State Forest	757 "
Mackinac State Forest	784 "
Manistique River State Forest	465 "
Michigamme State Forest	373 "

Planting, with roots dipped in aldrin

Fife Lake State Forest	915 acres
Grand Sable State Forest	264 "
Houghton Lake State Forest	31 "
Pigeon River State Forest	824 "

Of all the trees planted on state land in 1963, 48% received treatment by either dipping or spraying. Spraying is more desirable, as the aldrin is placed not only on the roots, but also in the soil around the roots, thus protecting them for at least four growing seasons. Dipping probably affords little protection after the first season. Dipping is used as an emergency measure when sprayers are not available and a grub infestation is found during the planting operation, or when hand planting the trees. Surveys prior to planting have not proven reliable and, therefore, all trees planted in areas of known grub infestations were treated.

JACK PINE SHOOT BORER - Eucosma sonomana Kearf.

Commonly found in many plantations in the western Upper Peninsula, the jack pine shoot borer injures jack pine, causing a deformity similar to that caused by the white pine weevil. (See Figure 3.) Unlike the weevil which confines its attack to the leader of the trees, the shoot borer also kills the lateral growth.

ZIMMERMAN PINE MOTH - Dioryctria zimmermani (Grote)

A thorough survey would probably reveal the presence of the Zimmerman pine moth in all counties of Michigan, although it is causing serious damage only in the Scotch pine Christmas tree plantations in southern Lower Michigan. In most other cases where red and jack pine are attacked, the damage is insignificant. Larvae, or their borings, are common in the woody galls on jack pine caused by the pine-oak or eastern gall rust. Generally, the branch beyond the gall will die in spite of the insect boring, and therefore the insect damage is unimportant.

When the Zimmerman pine moth larvae attack Scotch pine, two distinct types of feeding occur. The cambial region is mined, and the center of the new growth is mined. The first type of feeding may result in branch killing or complete tree mortality. The latter type of damge kills the outer portion of the new growth and is less important, as much of the new growth is often removed during shearing operations in Christmas tree plantations.

This insect is particularly serious in Ottawa, Allegan, and Saginaw counties on Scotch pine.

Figure 3.

Leader of jack pine killed by jack pine shoot borer.

* * *

OAK WILT

The following information on the oak wilt situation in Michigan is a summary prepared by the Division of Plant Industry, Michigan Department of Agriculture.

The picture continues to look good concerning the oak wilt program. The number of new locations found was down this year from ten to eight, while the number of old locations with new infections remained at six. The number of infected trees found at these locations dropped from 45 to 23, and the number of infected surrounding trees killed was 102. (See Map X.)

Using the four heavily infected counties of Barry, Cass, Kalamazoo and St. Joseph for comparison, the number of locations has been reduced by 85 percent and the number of infected trees by 89 percent during the eight years of the control program. The control program continues along the following lines:

(1) Location of suspected trees by air survey.

(2) Deep girdling and killing of the infected trees with 2,4-D ester.

(3) Location and killing of similar type oak within a 50-foot radius.

The main concern is that the lack of survey in lightly infected areas of central and eastern Lower Michigan counties may be permitting oak wilt build-up.

An attempt is made to survey one or two of the counties in southwestern area of Lower Michigan, in addition to the most heavily infected counties, but travel and time difficulties rule out surveying areas to the east. It is hoped that the budget may be increased in the future to allow a more complete survey and control program.

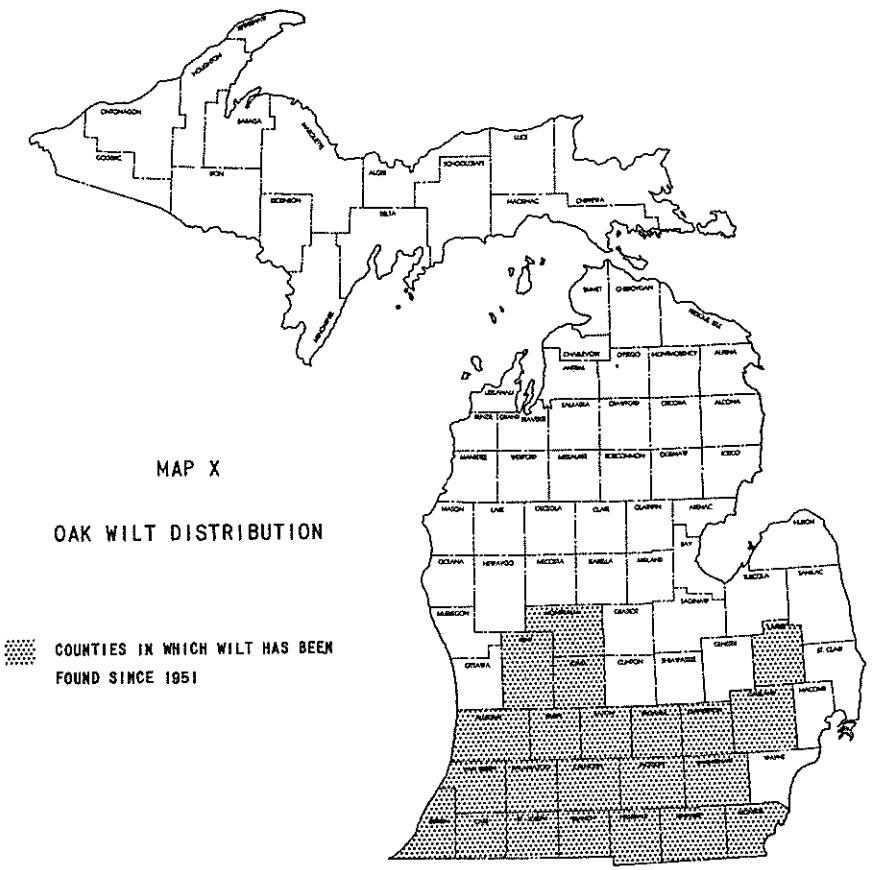
WHITE PINE BLISTER RUST

Blister rust control on state and private lands is coordinated and directed by the Michigan Department of Agriculture under a cooperative agreement with the U.S. Forest Service. A complete report of the project is published by the Michigan Department of Agriculture. Following is a summary of the report:

During 1963, 35,609 acres of white pine and 74,551 acres of control area were surveyed. These figures pertain to lands in state and private ownership and do not include National Forests.

Ribes eradication was carried out from April through October, using inmate labor obtained from local trustee camps, and as a result, 20,077 acres of white pine received protection from blister rust.

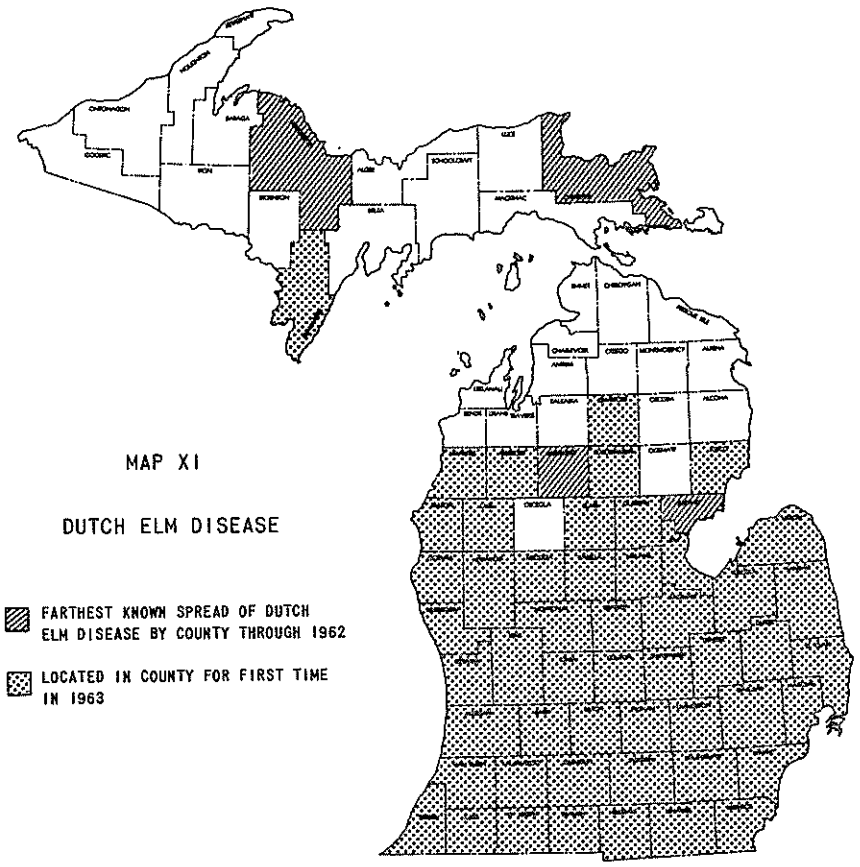
Initial ribes eradication has been accomplished on 84% of the control area, and 45% of this area has been placed on maintenance.



MAP X

OAK WILT DISTRIBUTION

COUNTIES IN WHICH WILT HAS BEEN FOUND SINCE 1951



MAP XI

DUTCH ELM DISEASE

FARTHEST KNOWN SPREAD OF DUTCH ELM DISEASE BY COUNTY THROUGH 1962

LOCATED IN COUNTY FOR FIRST TIME IN 1963

DUTCH ELM DISEASE

The Michigan Department of Agriculture, Plant Industry Division, coordinates a cooperative program of survey and control, working with the local units of government. Assistance is provided to municipalities in surveying for diseased, dead and dying elm trees and piles of elm wood in control areas. In addition, the Plant Industry Division issues and enforces condemnation orders for the destruction of such sources of disease innoculum and of the insect vectors, and operates a disease identification laboratory. The responsibility for spraying and sanitation for control of the elm bark beetles is placed on the individual communities and land owners.

A complete report on the 1963 Dutch Elm Disease Program in Michigan has been prepared by the Michigan Department of Agriculture and is briefly summarized as follows:

At the conclusion of the 1963 program, additional counties were added to the already known infested ones. There are now 52 counties in the Lower Peninsula and two in the Upper Peninsula from which positive specimens have been submitted. Generally speaking, the limits of infection seem to be south of a line through Manistee, Wexford, Missaukee, Roscommon, and Iosco counties in Lower Michigan. (See Map XI.) Positive specimens have been received from Marquette, Chippewa and Menominee counties in the Upper Peninsula. The Michigan Department of Agriculture Dutch Elm Disease Laboratory reports samples submitted by the following:

89 Communities	13,599
Michigan Highway Department	35
Conservation Recreation Areas	263
Institutional Grounds	206
Grand Total	14,103

Of these specimens, 12,203 were found infected. The number of dead trees condemned continued to increase and has jumped from 5,448 in 1958 to 11,008 in 1963.

* * *

OTHER CONDITIONS

DROUGHT

A deficiency of soil moisture continued throughout most of the state, with the result that many trees were in poorer condition than normal and more susceptible to damage by forest pests. This was evident in the case of the jack pine budworm, where one year of heavy defoliation resulted in some top killing and tree mortality. During periods of normal soil moisture, the trees are able to withstand more than one year of defoliation without serious damage.

HAIL

A severe hailstorm killed twigs and small branches in central Dickinson County. Balsam and aspen trees were most seriously injured because of the thin, smooth bark on the twigs. (See Figure 4.)

DECLINE OF ASH

Several instances of dying ash, and the similarity of the symptoms to the ash dieback in the northeastern states, caused concern in the southern part of Lower Michigan. Consequently, all forest districts were alerted and many ash stands inspected early in the summer.

On the Fort Custer area near Battle Creek, all the ash in a small area were dead. Many ash were dead or dying in and around the village of Lakeside in Berrien County. A similar situation was found near South Haven. In the Saginaw area, the condition of the ash stands varied from apparently healthy stands to wood lots, where about fifty percent of the ash were either dying or dead. In all cases, the other species of trees were in good condition.

The unhealthy trees had small leaves and thin crowns and were dying from the top down. Dead or dying trees were often next to apparently healthy trees.

Subsequent observations by foresters did not disclose additional areas of dying ash. It is planned to make additional checks during 1964.

MOUSE DAMAGE

Killing of pine by mice eating the bark near the ground was more common than usual during the winter of 1962-63. This damage became apparent in early 1963 and was particularly severe in Scotch and Austrian pine plantings.

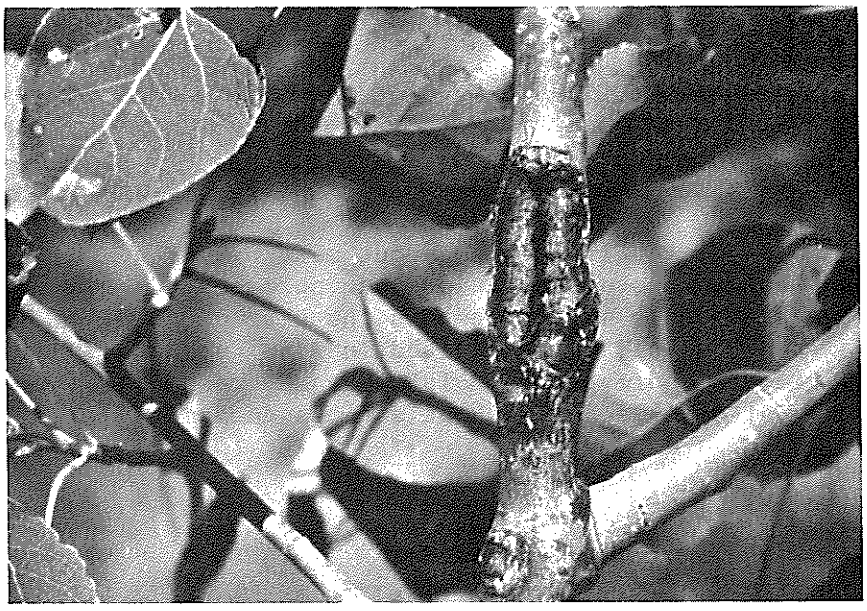


Figure 4.

Mechanical damage caused by hail.

SUMMARY

Jack pine in north central Lower Michigan was seriously defoliated by the jack pine budworm in 1963. Heavy infestations centered in southern Crawford, northwestern Ogemaw, southern Oscoda, southeastern Grand Traverse, northwestern Montmorency, southeastern Otsego, and southeastern Kalkaska counties. While previous outbreaks have not killed many merchantable trees in Michigan, the present infestations could have more serious effects because of the drought conditions existing in most jack pine stands.

Damage by the white pine weevil remained at the same high level as in 1962. It continues to be a serious problem in white, Scotch and jack pine plantations, and is becoming of increasing importance in red pine plantations. Jack pine on 274 acres of state land was sprayed by inmate crews using knapsack sprayers.

European pine shoot moth populations appeared to decline in 1963, as fewer reports of heavy and medium injury were received. In many areas in northern Lower Michigan and the Upper Peninsula, the shoot moth persists but causes little damage.

No spraying was necessary on state land in 1963 to control the red-headed pine sawfly, as the populations remained at a low level.

Saratoga spittlebug populations remained about the same level, with generally very light infestations in plantations where sweet fern is abundant.

Less defoliation by the anomala beetle was evident in 1963 than the previous year. The anomala beetle is not yet known to be present in the Upper Peninsula.

The larch sawfly continued to decrease throughout most of its range, with many reports indicating the lightest defoliation in many years. Scattered tree mortality has been observed in some stands, but is not of sufficient magnitude to cause much concern at present.

Populations of the European pine sawfly were again at a high level in the southern portion of Lower Michigan.

Forest tent caterpillars were found in most aspen and maple stands in northern Lower Michigan, although there was not any noticeable defoliation. Late spring and early summer frosts were probably responsible for suppressing the expected population increase.

Scotch, red, and jack pine plantations were seriously damaged by the pine root collar weevil, particularly in western Lower Michigan. The weevil, because of the difficulty of control, is one of the most serious pests of young pine plantations.

For the second year in a row, the Michigan Department of Agriculture gypsy moth trapping program failed to reveal any male moths, and therefore no spraying program is planned for 1964.

The linden looper, aspen leaf rollers, eastern tent caterpillar, jack pine shoot borer, Zimmerman pine moth, and other insects caused damage or defoliation of local concern.

The largest control project on state land in 1963 was directed towards preventing damage by white grubs to newly planted seedlings. A total of 4,549,000 treated trees was planted on 6,047 acres of state land.

Oak wilt aerial surveys were again greatly curtailed in 1963. However, progress against the disease looks promising. In the four counties which have had continuous survey and treatment during the eight years of the program, the number of locations was reduced by 85 percent and the number of infected trees reduced by 89 percent.

Dutch elm disease continues to spread northwards in the state and is known to be present from Crawford County south. In addition, it is present in Menominee and Marquette counties in the Upper Peninsula.

The white blister rust control program continued in Michigan, with 20,077 acres given protection by erradicating ribes plants.

* * *

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MICHIGAN DEPARTMENT OF CONSERVATION

Interoffice Communication

October 7, 1963

TO: All Cooperators, Michigan Forest Pest Detection Program

FROM: Paul R. Flink, Forest Entomologist

SUBJECT: 1963 FOREST PEST SITUATION

Following is a general summary of the forest pest situation in Michigan in 1963 on state and private lands. This information is obtained in part from observation area report forms and letters submitted by Conservation Department district foresters and cooperators in the forest pest detection program. More complete details will be printed in the Forest Pest Detection Program Annual Report.

The LARCH SAWFLY continued to decrease throughout most of its range with many reports indicating the lightest defoliation in many years. The larvae could be found in all larch stands in northern Michigan but were not numerous enough to cause the widespread heavy defoliation such as occurred during 1959 and the preceding few years. Scattered tree mortality has been observed in some stands but this is not of sufficient magnitude to cause much concern at present.

Where the JACK PINE BUDWORM caused extensive defoliation in 1961 in the jack pine stands in Baraga County on the Baraga Plains, Marquette County north of Gwinn, Boardman River Plains in Grand Traverse County, and Danaher Plains in Luce County, the trees are recovering well and in places, little effects of the defoliation can be noted. The population of budworms dropped in 1962 in these areas and were virtually absent in 1963.

However, in some areas, budworm populations built up in 1962 and 1963 and very heavy defoliation occurred in the central part of lower Michigan particularly in the following areas:

Ogemaw County T 24 N, R 1 E
Crawford County T 25 N, R 3 W; T 25 N, R 4 W; T 26 N, R 3 W
Kalkaska County T 25 N, R 5 W; T 27 N, R 8 W
Grand Traverse County T 25 N, R 9 W
Otsego County T 29 N, R 1 W
Montmorency County T 32 N, R 1 E; T 32 N, R 2 E

Previous outbreaks in Michigan have usually disappeared without causing much tree mortality of [illegible] trees. The present infestation, however, could have more serious effects because of the drought conditions existing in many jack pine areas.

The amount of jack pine acreage or the value involved in the outbreak is not known at present but will be determined from subsequent surveys.

Scotch, red and jack pine plantations are being seriously damaged by the PINE ROOT COLLAR WEEVIL particularly in western Lower Michigan. Mortality has occurred in plantations as young as 5 years and as old as 30 years and natural red pine was killed in one place in Schoolcraft County. Because of the high susceptibility of Scotch pine to the weevil, serious build-ups and the resulting mortality are going to eliminate many plantations that have grown past Christmas tree size.

Natural trees, while attacked, are seldom killed. The root collar weevil is much more serious on planted pine. Red pine plantations are generally not seriously injured unless they are growing adjacent to Scotch or jack pine. This insect, because of its difficulty to control by chemical means and our lack of knowledge of control by other methods, is at present a serious problem. Certain cultural practices appear to reduce the incidence of mortality, such as maintaining good stocking by replanting if initial survival is poor, proper depth of planting, and pure plantings of red pine rather than mixtures with jack pine.

Widespread defoliation of aspen by ASPEN LEAF ROLLERS occurred in north central and northeastern Lower Michigan from Ogemaw County northward. Several species were involved with one of the primary species being Epinotia nissella creddleana. Some areas in Roscommon County were less heavily defoliated than in 1962 while other areas were more completely stripped. In addition to Lower Michigan, the eastern end of the Upper Peninsula suffered from heavy defoliation. The trees remained with thin crowns throughout the summer.

FOREST TENT CATERPILLARS were found in many aspen and hard maple stands throughout northern Michigan but due to the presence of aspen leaf rollers, linden loopers, and other insects, it was difficult to assess the amount of defoliation caused by the forest tent caterpillar. However, even where other insects were not present in large numbers, and forest tent caterpillars were numerous, no noticeable defoliation was observed.

No signs of an increase in the forest tent caterpillar were reported from the Upper Peninsula. In the northern Lower Peninsula, a continued increase is expected.

Hardwoods in western Emmet County were stripped by the LINDEN LOOPER. Most species of hardwoods were attacked in an area about 15 miles square north of Harbor Springs. While it is not expected that serious damage will occur to the trees, these insects are a considerable nuisance to residents of the area as they drop from the trees on threads and crawl over everything. In a situation such as this, local control by the property owners is sometimes desirable.

The LARGE ASPEN TORTRIX defoliated aspen on several acres in Emmet County. This pest has caused widespread defoliation in Michigan in the past but usually disappears after a year or two without harming the trees.

EASTERN TENT CATERPILLAR webs and caterpillars were very noticeable throughout much of Lower Michigan for the third year of high populations. Many large cherry trees were completely stripped and had over 15 webs. However, in northern Lower Michigan the numbers of caterpillars were greatly reduced during the summer possibly by frost in late May and June, and cocoons and moths were fewer than expected.

BASSWOOD LEAF ROLLERS were abundant in northern Lower Michigan causing up to 50 percent defoliation on some basswood trees. This is not expected to have much effect on the trees. Leaf rollers were also present on many maple trees.

While probably not serious by itself, defoliation by the PINE NEEDLE SHEATH MINER of jack pine in jack pine budworm infestations adds to the seriousness of the budworm defoliation. This pest can be found in most jack pine stands in northern Michigan.

Populations of the EUROPEAN PINE SAWFLY were again at a high level in southern Lower Michigan with reports of increasing populations in the Ingham-Clinton county area as well as the southeastern counties. This is a relatively easy insect to control and many private plantations were sprayed to prevent damage by this pest.

In general, the RED-HEADED PINE SAWFLY remained at a low level. Only in Emmet and Cheboygan counties were light infestations reported. Whether or not this is indicative of another widespread outbreak is not known at this time.

All reports for the SPRUCE BUDWORM in the Upper Peninsula were negative.

WHITE PINE WEEVIL infestations remained at about the same or reduced levels. It continues to be a serious problem in white, Scotch and jack pine plantations, and is becoming of increasing importance in red pine plantations.

Other insects causing damage or local concern were:

Dioryctria disclusa larvae mining and killing jack pine cones in Kalkaska County.

FALL WEBWORMS defoliating hardwoods throughout the state, varying greatly in intensity.

Zeiraphera ratzeburgiana deforming spruce tips in Chippewa County.

Pteronidea trilineata stripping black locust leaves in Emmet County.

JACK PINE SHOOT BORER infesting and deforming young jack pine plantations in the western Upper Peninsula.

ZIMMERMAN PINE MOTH killing part of new growth of Scotch and red pines, and occasionally whole trees. This is particularly serious in Ottawa and Saginaw county areas on Scotch pines.

Of interest is a new location of the DUTCH ELM DISEASE in Marquette in Upper Michigan. It had previously only been found in Menominee County in Upper Michigan.

HAIL caused flagging of balsam in Dickinson County north of Iron Mountain. Other effects of the weather were poor survival of newly established plantations due to dry weather following planting, and killing of the new growth by frosts on May 23, 24, and 25 and June 22.

MICE were responsible for killing many pine trees during the past winter including Scotch pine in Manistee County and Austrian in Lapeer County.

During the summer an attempt was made to determine the seriousness of the DECLINE of ASH in southern Lower Michigan. While this general survey is not complete, several comments can be made. It is not known at present if the ash situation in Michigan is the same as the "ash dieback" affecting much of the ash in the eastern states.

In Michigan, there is a great variation in the condition of the ash in forest stands from apparent good health to stands where over 50 percent of the ash are dead or dying. In the stands where the ash is dead or dying, the other species are in apparent good health.

The unhealthy ash trees have small leaves, thin crowns, and often have yellowish leaves. In addition many dead branches are present, particularly in the upper part of the crown. The trees appear to be dying from the top down.

The ash problem seems to be serious enough to warrant a more complete survey in 1964 to determine what percent of the ash trees and stands are affected.

PRF:bp
10-7-63